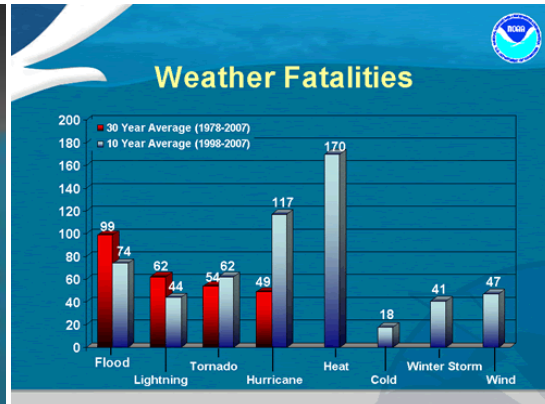


Wind Storms



Just about every corner of the world has experienced some kind of damaging or life threatening wind storm of one kind or another.



A photograph of the surface curl soon after a microburst impacted the surface

These windstorms come in many forms from straight line winds, downbursts, micro and macro bursts, tornadoes, typhoons, cyclones, tropical depressions and hurricanes. They have caused billions in damage, downed planes, capsized ships and taken lives.

Just to give you an idea of what a 'plain old wind storm' can do:

On Columbus Day, October 12, 1962, the strongest non-tropical windstorm (sustained winds of 150 mph and gusts up to 179 mph) ever to hit the lower 48 states in recorded American history struck the Pacific coast. The storm claimed 46 lives, injured hundreds more, and knocked power out for several million people. Many wind reports were lost because of power outages, with peak winds likely occurring after the power was out.

The storm packed hurricane-force winds caused \$235 million in property damage (\$1.4 billion in 2001 dollars). In addition, it blew down over 15 billion board feet of timber (valued at \$750 million in 1962 dollars), from the west coast (northern California, through Oregon and Washington, into British Columbia) to as far inland as western Montana.

None of these storms are to be taken lightly!

Heat Burst Damage



There are 2 sayings that truly apply to these storms and preparedness:

*Prepare for the worst and hope for the best.
Better safe than sorry.*

With that in mind **remember these 2 authoritative organizational responses protocols to crises:**

Any authoritative entity will wait until the last possible moment to issue an evacuation notice.

Although each state has its own evacuation laws there are generally two types:

Mandatory and Suggested

Mandatory is NOT forced unless the President issues a special executive order giving the local authorities the legal ability to drag you out of your home kicking and screaming. This executive privilege has only been enacted a few times and in all those cases the local authorities did NOT take advantage of it. They stated they did not have enough time or resources to do this and barely had enough time and resources to make sure everyone got the evacuation notice in the first place.

Note: *New Mexico only has Suggested*, no mandatory evacuation notices and NO pre-designated or pre-planned routes.

Search and Rescue entities have a strategic plan that allows them to leverage limited time, personnel, equipment and supplies to find and rescue the most people after the crisis passes. This is based on numerous “post crisis” studies.

In an area that was effected by the crisis they will:

First respond to the section that was devastated that did not receive any type of evacuation notice; as this is where the largest number of needy people are historically located.

Second response is to the section that received a suggested evacuation notice and was still devastated. Again, historically this is where the next largest number of people in need are likely to be.

Third and Lastly response is to the section that received the mandatory evacuation notice as only an average of 3-7% of the people will NOT heed the notice and evacuate. Historically this is where the least number of needy people will be.



Bottom Line:

Do NOT wait for the evacuation notice to start packing to leave. Instead when the threat is first noted, start packing, moving stock, boarding up windows and the like. So when and if a notice is issued, you just have to get everyone in your vehicle and head out.

If you have good gut instincts and trust them – leave *before* the notice is even issued.

If you are not in safety, emergency, fire, rescue or military and your employer insists that you stay until the evacuation notice is issued; remind them that *they are lucky you work for them, not the other way around* and you are going to get your family to safety *before* any mass evacuation. Now your employer may dock your pay or take the time from your paid time off bank, so be prepared for that. However if your employer threatens you with loss of job and the like – **it is up to you** to either follow your gut or obey the egotistical, dictatorial, slave driving, forked tongued, two-faced, lying, corrupted SOB or not (and you can always sue the bastard afterward).

Considering the expense involved in evacuations, not to mention the logistic nightmare – **leave when they are issued.** Before you choose to stay behind, ask yourself the following three questions:

- ✓ Will staying behind change anything in terms of saving your home?
- ✓ Can my family and I handle staying behind? Can they handle what I can handle?
- ✓ If I stay behind and evacuate my family, can we handle the possibility of never seeing each other again?

Above all understand that staying behind WILL be life threatening, so your entire household should be prepared for *any* consequences of doing so.



Flock of birds caught in a vortex

Here is a list of NOAA/NWS Weather Outlook, Watch, Warning, Advisory Definitions concerning WIND:

Hazardous Weather Outlooks will describe in concise, non-technical terms hazardous weather, hydrologic, and non-precipitation information of concern in Days 1 through 7.

The outlook contains two segments: One segment for the marine zones and adjacent land-based (i.e., coastal) zones and the other segment for the rest of the land-based zones/counties. Each segment of the HWO will contain 3 sections: short term through Day 1, long term for Days 2-7, and spotter information.

A **High Wind Watch** is issued when the following conditions are possible:

- 1) sustained winds of 40 mph or higher for one hour or more
- OR
- 2) wind gusts of 58 mph or higher for one hour or more.

A **High Wind Warning** is issued when the following conditions are occurring or imminent:

- 1) sustained winds of 40 mph or higher for one hour or more
- OR
- 2) wind gusts of 58 mph or higher for one hour or more.

A **Wind Advisory** is issued when the following conditions are expected for 3 hours or longer.

- 1) sustained winds of 31 to 39 mph
- AND/OR
- 2) wind gusts of 46 to 57 mph.

An **Extreme Wind Warning** is issued for surface winds of 100 knots (115 MPH) or greater associated with non-convective, downslope, derecho (NOT associated with a tornado), or sustained hurricane winds are expected to occur within one hour.

A **Severe Thunderstorm Watch** is issued when severe thunderstorms are possible in and near the watch area. It does not mean that they will occur. It only means they are possible.

Severe thunderstorms are defined as follows:

- 1) Winds of 58 mph or higher
- AND/OR
- 2) Hail 1 inch in diameter or larger.

A **Severe Thunderstorm Warning** is issued when severe thunderstorms are occurring or imminent in the warning area.

Severe thunderstorms are defined as follows:

- 1) Winds of 58 mph or higher
- AND/OR
- 2) Hail 1 inch in diameter or larger.

A **Tornado Watch** is issued when severe thunderstorms and tornadoes are possible in and near the watch area. It does not mean that they will occur. It only means they are possible.

Severe thunderstorms are defined as follows:

- 1) Winds of 58 mph or higher
- AND/OR
- 2) Hail 1 inch in diameter or larger.

A **Tornado Warning** is issued when a tornado is imminent. When a tornado warning is issued, seek safe shelter immediately.

A **Tropical Storm Watch** is issued when a tropical cyclone containing winds of 34 to 63 kt (39 to 73 mph) or higher poses a possible threat, generally within 48 hours. These winds may be accompanied by storm surge, coastal flooding, and/or river flooding.

A **Tropical Storm Warning** is issued when sustained winds of 34 to 63 kt (39 to 73 mph) or higher associated with a tropical cyclone are expected in 36 hours or less. These winds may be accompanied by storm surge, coastal flooding, and/or river flooding.

The watch does not mean that tropical storm conditions will occur. It only means that these conditions are possible.

A **Hurricane Watch** is issued when a tropical cyclone containing winds of 64 kt (74 mph) or higher poses a possible threat, generally within 48 hours. These winds may be accompanied by storm surge, coastal flooding, and/or river flooding.

The watch does not mean that hurricane conditions will occur. It only means that these conditions are possible.

A **Hurricane Warning** is issued when sustained winds of 64 kt (74 mph) or higher associated with a tropical cyclone are expected in 36 hours or less. These winds may be accompanied by storm surge, coastal flooding, and/or river flooding. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue, even though winds may be less than hurricane force.

(For a complete list see <http://www.erh.noaa.gov/lwx/Defined/index.htm>)

General Information to get you started:

- ✓ American Red Cross www.redcross.org
- ✓ Centers for Disease Control and Prevention Disaster Preparedness <http://emergency.cdc.gov/disasters/>
- ✓ Department of Homeland Security & Federal Emergency Management Agency (FEMA is part of DHS since 2001) Emergency Preparedness <http://www.Ready.gov/>
- ✓ Emergency Preparedness Checklist <http://wyohomelandsecurity.state.wy.us/pubs/checklist.pdf>
- ✓ Each branch of the US Military has a Preparedness Directive (the Army, Navy and Coast Guard have web sites too) for military families with plenty of information for the service person and their dependents; for on base or off, stationed here or overseas.
- ✓ Every state, many counties and cities have Preparedness web sites and information specific to their areas. Look up 'preparedness', 'hazard' or 'emergency' to find it.
- ✓ Just about every national and local; law enforcement, fire and rescue have web sites and information on preparedness.
- ✓ Prepping for Animals Pets and Livestock <http://www.scribd.com/doc/31791013/Prepping-for-Animals-Pets-and-Livestock>
- ✓ How to Make a Preparedness Plan That Works & Not Go Broke <http://www.scribd.com/doc/50950827/How-to-Make-a-Preparedness-Plan-That-Works-Not-Go-Broke-Ver-6>
- ✓ Preparing Your Emergency Documentation Book-Binder <http://www.scribd.com/doc/50950919/Preparing-Your-Emergency-Documentation-Book-Binder>
- ✓ Important Document Book Forms to Print & Complete <http://www.scribd.com/doc/59157077/Important-Document-Book-Forms-to-Print-Complete-Ver-2>
- ✓ Just How Prepared Are You? - Tests & Quizzes <http://www.scribd.com/doc/72386930/Just-How-Prepared-Are-You-Tests-Quizzes>
- ✓ Preparedness Bags Checklist Compare (goes with What is the Difference Between All the E-Kits and Bags and What Do I Need?) <http://www.scribd.com/doc/41973071/Preparedness-Bags-Checklist-Compare>
- ✓ What is the Difference Between All the E-Kits and Bags and What Do I Need? (goes with "Preparedness Bags Checklist Compare") <http://www.scribd.com/doc/41974496/What-is-the-Difference-Between-All-the-E-Kits-and-Bags-and-What-Do-I-Need>
- ✓ Food Safety for Consumers Returning Home After a Hurricane and/or Flooding <http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm076993.htm>
- ✓ Key Tips for Consumers About Food and Water Safety <http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm077029.htm>

- ✓ Power Outages: Key Tips for Consumers About Food and Water Safety
<http://www.fda.gov/Food/ResourcesForYou/Consumers/ucm077023.htm>
- ✓ Taking Care of Pets During a Disaster or Emergency
<http://www.fda.gov/AnimalVeterinary/ResourcesforYou/ucm047099.htm>
- ✓ Safe Drug Use After a Natural Disaster
<http://www.fda.gov/Drugs/EmergencyPreparedness/ucm085200.htm>
- ✓ Information Regarding Insulin Storage and Switching Between Products in an Emergency
<http://www.fda.gov/Drugs/EmergencyPreparedness/ucm085213.htm>
- ✓ FDA Offers Tips about Medical Devices and Hurricane Disasters
<http://www.fda.gov/MedicalDevices/Safety/EmergencySituations/ucm055987.htm>
- ✓ Impact of Severe Weather Conditions on Biological Products (Vaccines, Blood, Biologics)
<http://www.fda.gov/BiologicsBloodVaccines/SafetyAvailability/ProductSecurity/ucm147243.htm>



These winds, known as 'downbursts', are often mistaken for tornadoes

Illustration of a microburst

Windstorms

The following is some basic windstorm safety preparations and precautions that should be taken in regards to different types of windstorms. These steps will aid in protecting you and yours.

Facts about Windstorms:

- Falling trees or blowing debris cause most fatalities and also cause severe damage to buildings and vehicles.
- Power pole and line damage cause widespread power outages.
- Failure of roof cover and structures can lead to additional damage and entry of wind and rain into the house.
- Garage doors are the weakest link in the outer structure of a house. Failure at this point has a domino effect.
- Exterior load-bearing walls of buildings can fail resulting in the collapse of the roof.
- Weathered, loose window frames are exceptionally vulnerable during severe wind storms.
- A light metal building can totally collapse.
- Office buildings are generally structurally sound, but broken windows cause injuries inside and outside the building, leading to water damage and injuries.
- Bus stop shelters and other common areas where people seek shelter are vulnerable and could collapse, resulting in significant injuries and fatalities.

Most at Risk

- The uninformed.
- People in automobiles.
- The elderly, very young and the physically or mentally impaired.
- People in mobile homes or single layer metal/wood buildings
- People who may not understand the warning due to a disability or language barrier.

Wind Storm Weather Alerts and Advisories - Know the Difference

A **High Wind Watch** is issued when the following conditions are possible:

- 1) sustained winds of 40 mph or higher for one hour or more
- OR
- 2) wind gusts of 58 mph or higher for one hour or more.

A **High Wind Warning** is issued when the following conditions are occurring or imminent:

- 1) sustained winds of 40 mph or higher for one hour or more
- OR
- 2) wind gusts of 58 mph or higher for one hour or more.

A **Wind Advisory** is issued when the following conditions are expected for 3 hours or longer.

- 1) sustained winds of 31 to 39 mph
- AND/OR
- 2) wind gusts of 46 to 57 mph.

An **Extreme Wind Warning** is issued for surface winds of 100 knots (115 MPH) or greater associated with non-convective, down slope, derecho (NOT associated with a tornado), or sustained hurricane winds are expected to occur within one hour.

Before a Windstorm:

- Contact your local Emergency Management Office or the National Weather Service to find out what types of storms are most likely to occur in your community.
- Assemble a disaster supply kit.
- Contact vendors to know the proper use of home generators.
- Find out who in your area might need special assistance, specifically the elderly, disabled, or non-English speaking neighbors.
- Check with your veterinarian for animal care instructions in an emergency situation.
- If you live on a coastal or inland shoreline, be familiar with evacuation routes.
- Know what emergency plans are in place at your workplace, school and daycare center and your town.
- Conduct a home safety evaluation, including the garage door, and nearby trees
- If you have an electric garage door opener, locate the manual override.

During a Windstorm:

- Don't panic. Take quick action to protect yourself and help others.
- Turn off the stove if you're cooking when the power goes out and turn off natural gas appliances.
- If you are indoors, move away from windows or other objects that could fall and to lower floors in multi-story homes.

- If you are outdoors, move into a building and avoid downed electric power lines, utility poles and trees.
- If you are driving, pull off the road and stop away from trees. If possible, walk into a safe building. Avoid overpasses, power lines and other hazards.
- Listen to your radio or TV for emergency instructions.

After a Windstorm:

- Check yourself and those around you for injuries.
- Evacuate damaged buildings. *Do not re-enter* until declared safe by authorities.
- Call 9-1-1 only to report a life threatening emergency.
- If you smell gas or hear a hissing sound indoors — open windows and leave the building. Turn off the gas source and call your gas company. Do not use matches, candles, open flames or electric switches indoors.
- If the power goes out, keep refrigerator and freezer doors closed *to keep food frozen for up to two days*. Note: **Food in chest type refrigerators and freezers will last longer than uprights.** (cold air sinks, hot air rises)
- Provide assistance to your neighbors, especially the elderly or disabled.
- Try to make contact with your out-of-area phone contact, but avoid making local telephone calls.
- Monitor your portable or weather radio for instructions or an official “all clear” notice. Radio stations will broadcast what to do, the location of emergency shelters, medical aid stations, and the extent of damage.

From “**Windstorms**” found @ <http://www.wrh.noaa.gov/sew/WindstormBro.pdf>



According to a **RedCross.org** article titled ‘**Talking About Disaster-Guide for Standard Messages-Wind Safe Room**’ it states:

“Wind Safe” Room

A “wind safe” room is a reinforced area of a home designed to withstand severe windstorms. While basements offer some protection from damaging winds, the level of protection can be increased greatly by building a reinforced shelter area in a basement, or constructing a shelter in an above-ground room such as an interior closet or a small study room.

An effective “wind safe” room must be strong enough to survive extreme wind speeds and the impact of airborne debris, sufficiently affordable to appeal to homeowners, and accessible quickly in the event a severe storm approaches. “Wind safe” rooms are

easiest to install when a home is being built; however, they can also be added to many existing homes. A variety of options exists for homes with basements, homes built on a "slab-on-grade" foundation, and homes with a "crawl-space" foundation. Typical costs range from \$2,000 for a simple "lean-to" shelter in a new-home basement, to \$6,000 or more for an above-ground, steel-sheathing shelter.

Get more information from the Federal Emergency Management Agency (FEMA) about building a "wind safe" room.

Also for more information, check out the Institute for Business and Home Safety at www.ibhs.org.

Detailed construction plans and information related to safe rooms can be found at <http://www.fema.gov/mit/saferoom/>."

The University of Florida IFAS extension has a great checklist for windstorm (hurricane) damage mitigation, however it is excellent as a pre-windstorm preventative checklist too!

The checklist was compiled from recommendations of many insurance companies and covers wind as well as flood issues. I highly recommend it. You can download "**Homeowner Windstorm Damage Mitigation Checklist**" in PDF format from:

http://stlucie.ifas.ufl.edu/pdfs/hurricane_house/Homeowner%20Checklist.pdf

March 28, 2000



Tornado Damage Fort Worth, TX







Tornado

A tornado is a violently rotating column of air extending from the base of a thunderstorm down to the ground. They are one of the most violent natural hazards. Strong winds are the most destructive aspect, with gusts reaching as high as 300 mph. The damage path can be a mile wide.







They are capable of completely destroying well made structures, uprooting trees and hurling objects through the air like deadly missiles.

Wind Storms - Continued

Tornado intensities are classified on the Fujita Scale with ratings between F0 (weakest) to F5 (strongest). Note: Since 2007 the Enhanced Fujita (EF) scale is now used and still runs from F0 to F5 but is slightly less subjective.

F Number	Fastest ¼ Mile (mph)	3 Second gust (mph)	EF Number	3 Second gust (mph)	EF Number	3 Second gust (mph)
0	40-72	45-78	0	65-85	0	65-85
						
1	73-112	79-117	1	86-109	1	86-110
						
2	113-157	118-161	2	110-137	2	111-135
						

Wind Storms - Continued

3	158-207	162-209	3	138-167	3	136-165
						
4	208-260	210-261	4	168-199	4	166-200
						
5	261-318	262-317	5	200-234	5	Over 200
						

Tornado season is *generally* March through August, but they can occur anytime of the year, in any part of the country. Tornadoes *most often* occur at the tail end of a thunderstorm. 80% of tornadoes occur between noon and midnight.

Tornadoes have been reported in every state, although severe tornadoes are more common in the Plains States, so it is in your best interest to be prepared.



Chuck Dewell III

Weak Tornadoes

- 88% of all tornadoes
- Less than 5% of tornado deaths
- Lifetime 1 – 10+ minutes
- Winds less than 110 mph
- Produces EF0 or EF1 damage



Wilmrediaustin Hobson

Strong Tornadoes

- 11% of all tornadoes
- Nearly 30% of all tornado deaths
- May last 20 minutes or longer
- Winds 111-165 mph
- Produces EF2 or EF3 damage



Wilmrediaustin Hobson

Violent Tornadoes

- Less than 1% of all tornadoes
- 70% of all tornado deaths
- Can exceed 1 hour
- Winds greater than 166 mph
- Produces EF4 or EF5 damage

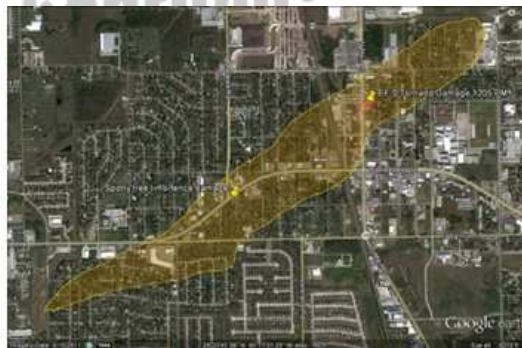
Tornado Weather Alerts and Advisories - Know the Difference

Tornado Watch: Tornadoes are possible in and near the watch area. Review and discuss your emergency plans, and check supplies and your safe room. Be ready to act quickly if a warning is issued or you suspect a tornado is approaching. Acting early helps to save lives!

Tornado Warning: A tornado has been sighted or indicated by weather radar. Tornado warnings indicate imminent danger to life and property. Go immediately underground to a basement, storm cellar or an interior room (closet, hallway or bathroom).



Damage Fort Worth March 2000



Pearland, TX (Houston) Damaging Wind and Tornado Track
(From NWS Houston)



Chair from the Bank One Tower inside car
Fort Worth March 2000

Before a Tornado

During any storm, listen to local news or a NOAA Weather Radio to stay informed about watches and warnings.

- Stay informed and know tornado terminology:
- Know your community's warning system. Communities have different ways of warning residents about tornadoes, with many having sirens intended for outdoor warning purposes.
- Pick a safe room (no windows) in your home where household members and pets may gather during a tornado:

- A storm shelter or basement provides the best protection.
- Otherwise, choose an interior room or hallway on the lowest floor possible.
- Consider having your safe room reinforced. Plans for reinforcing an interior room to provide better protection can be found on the FEMA Web site at <http://www.fema.gov/plan/prevent/rms/rmsp453.shtm>.
- Create an emergency kit, have a plan and practice.
- Practice periodic tornado drills so that everyone knows what to do if a tornado is approaching.
- Prepare for high winds by removing diseased and damaged limbs from trees.
- Move or secure lawn furniture, trash cans, hanging plants or anything else that can be picked up by the wind and become a projectile.
- Watch for tornado danger signs:
 - Dark, often greenish clouds—a phenomenon caused by hail
 - Wall cloud—an isolated lowering of the base of a thunderstorm
 - Cloud of debris
 - Large hail
 - Funnel cloud—a visible rotating extension of the cloud base
 - Roaring noise



Approaching/during a Tornado

The safest place to be is an *underground* shelter, basement or safe room.

- Take shelter immediately in the designated room.
- If no underground shelter or safe room is available, a small, windowless interior room or hallway on the lowest level of a sturdy building is the safest alternative.
 - Mobile homes are not safe during tornadoes or other severe winds.
 - Do not seek shelter in a hallway or bathroom of a mobile home.
 - If you have access to a sturdy shelter or a vehicle, abandon your mobile home immediately.
 - Go to the nearest sturdy building or shelter immediately, using your seat belt if driving.
 - Do not wait until you see the tornado.
- If you are outside, find shelter immediately or, if shelter is unavailable, lie flat in a ditch or lowlying area.

- If caught in the open find the lowest place like a ditch or hole and kneel bent over in a tight ball with your covering the back of your neck and head, eyes to the ground.
- If you cannot quickly walk to a shelter:
 - Immediately get into a vehicle, buckle your seat belt and try to drive to the closest sturdy shelter.
 - If flying debris occurs while you are driving, pull over and park.
- If you are in a car, stop immediately and find shelter. Do NOT try to drive through a tornado.
- If Stuck in your vehicle, you have the following options as a last resort:
 - Stay in the car with the seat belt on. Put your head down below the windows, covering with your hands and a blanket if possible.
 - If you can safely get noticeably lower than the level of the roadway, exit your car and lie in that area, covering your head with your hands.
- Stay tuned to radio or TV for information and instructions as they become available.
- Stay in shelter until the tornado has passed.



After a Tornado

Continue listening to local news or a NOAA Weather Radio or TV for updated information and instructions.

- Stay tuned to radio or TV for further information or instructions.
- If you are away from home, return only when authorities say it is safe to do so.
- Wear long pants, a long-sleeved shirt and sturdy shoes when examining your walls, doors, staircases and windows for damage.
- Watch out for fallen power lines or broken gas lines and report them to the utility company immediately.
- Stay clear of downed power lines.
- Stay out of damaged areas and buildings (unless you trained to do otherwise).
- Inspect your home for damage, but be careful of unseen damage.
 - Use battery-powered flashlights when examining buildings—do NOT use candles.
 - If you smell gas or hear a blowing or hissing noise, open a window and get everyone out of the building quickly and call the gas company or fire department.
 - Take pictures of damage, both of the building and its contents, for insurance claims.
- Use the telephone only for emergency calls.
- Keep all of your animals under your direct control.
- Clean up spilled medications, bleaches, gasoline or other flammable liquids that could become a fire hazard.

- Check for injuries. If you are trained, provide first aid to persons in need until emergency responders arrive.



Additional Information to Get You Started

Tornado Safety Checklist <http://www.redcross.org/www-files/Documents/pdf/Preparedness/checklists/Tornado.pdf>

Navy Operation Prepare Tornado

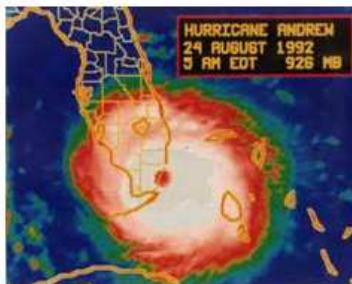
http://www.cnip.navy.mil/navycni/groups/public/@pub/@hq/documents/document/cnip_026465.pdf

Ready Army Tornado http://www.acsim.army.mil/readyarmy/Tornado_Fact_Sheet%5B1%5D.doc

Centers for Disease Control and Prevention Disaster Preparedness Tornado

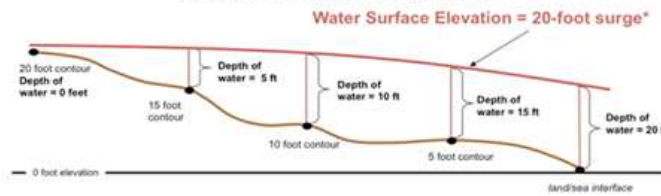
<http://emergency.cdc.gov/disasters/tornadoes/>

Ready.gov Tornado Safety Tips <http://www.ready.gov/ready-gov-emergency-notification/tornado-safety-tips-0> and www.ready.gov/america/beinformed/tornadoes.html



What does a 20-foot storm surge really mean to your location?

Storm surge models output water surface elevations for a specific area (grid cell)



Hurricane Ike approaches Texas Sept. 12, 2008

Hurricane

A hurricane is a tropical cyclone, a low-pressure system that originates in the tropics. The cyclone usually includes intense thunderstorms and strong winds that can exceed 155 mph. Hurricanes and tropical storms can further result in tornadoes and heavy flooding. Hurricanes can cause extensive damage through both strong winds and high flood waters from rain and storm surges.

Preparation is the best protection against the dangers of a hurricane.



Irene NC Hurricane Irene:

8 Known Dead, 2 Million Without Power



Irene



The aftermath of Hurricane Katrina in Gulfport, Mississippi.

Hurricane Weather Alerts and Advisories - Know the Difference

Hurricane Watch—Hurricane conditions are a threat within 48 hours. Review your hurricane plans, keep informed and be ready to act if a warning is issued.

Hurricane Warning—Hurricane conditions are expected within 36 hours. Complete your storm preparations and leave the area if directed to do so by authorities.



Isabel



Felix



Floyd



Irene 2011

Important Hurricane Terms

Stay informed and know your hurricane terminology:

- **Tropical depression**—A system of clouds and thunderstorms with a defined surface circulation and sustained winds that do not exceed 38 mph.
- **Tropical storm**—A system of clouds and thunderstorms with a defined surface circulation and sustained winds 39–73 mph.
- **Hurricane**—A system of clouds and thunderstorms with a defined surface circulation and sustained winds 74 mph or higher.
- **Storm surge**—A dome of water pushed ashore by winds during tropical storms and hurricanes. Storm surges can reach 25 feet high and be 50–1000 miles wide.
- **Storm tide**—A combination of storm surge with normal tide, increasing the amount of water (e.g., a 15-foot storm surge with a 2-foot normal tide creates a 17-foot storm tide).
- **Hurricane/tropical storm watch**—Hurricane/tropical storm conditions are possible within 36 hours in specified areas. Stay tuned to radio or TV for further information.
- **Short-term watches and warnings**—Provide detailed information about specific threats during hurricanes, such as flash flooding or tornadoes.



Katrina New Orleans levees topple



Katrina



Katrina

Categorization of Hurricanes:

Strength	Wind	Storm Surge	Damage
Category 1	74–95 mph (120 to 153 km/h)	4–5 feet (1.2 m to 1.5 m)	Damage primarily to shrubbery, tree foliage and unanchored mobile homes; no real damage to other structures; minimal damage to plants and signs; Some damage to poorly constructed signs; Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings
Category 2	96–110 mph	6–8 feet (1.8 m to 2.4 m)	Considerable damage to shrubbery and tree foliage; Major damage to exposed mobile homes; some trees blown down; Extensive damage to poorly constructed signs; Some damage to roofing materials of buildings; Coastal roads and low-lying escape routes inland cut by rising water two to four hours before arrival of windstorm center; some flooding, minimal damage to mobile homes, roofs, and small crafts; Considerable damage to piers, marinas flooded; small craft in unprotected anchorages torn from moorings; evacuation required for some shoreline residences and low-lying islands
Category 3	111–130 mph	9–12 feet (2.7 m to 3.6 m)	Limbs torn from trees and large trees blown down; Nearly all poorly constructed signs blown down; Damage to roofing materials of buildings; some window and door damage; Mobile homes destroyed; Serious flooding at coast and many smaller structures near coast destroyed; larger structures near

Wind Storms - Continued

			coast damaged by battering waves and floating debris; Low-lying escape routes inland cut by rising water three to five hours before windstorm center arrives; extensive damage to small buildings and low-lying roofs; Flat terrain up to 5 ft. (1.5 m) above sea level flooded inland 8 miles (13 km) or more; possible required evacuation of low-lying residences within several blocks of shoreline.
Category 4	131–155 mph	13–18 feet (4 m to 5.5 m)	Flat terrain up to 10 ft. (3 m) above sea level flooded inland as far as 6 miles (9.6 km); Shrubs and trees blown down; all signs down; Extensive damage to inadequately installed roofing materials, windows and doors; complete failure of roofs on many small residences; Complete destruction of mobile homes; Major damage to lower floors of structures near shore; Low-lying escape routes inland cut by rising water several hours before windstorm center arrives; extreme damage with destroyed roofs and mobile homes, downed trees, cut off roads, and flooded homes; Major erosion of beaches; possible required evacuation of all residences within 500 yards (457 m) of shore and single-story residences on low ground within 2 miles (3.2 km) of shore
Category 5	exceeding 155 mph	over 18 feet (5.5 m)	Shrubs and trees blown down; Considerable damage to roofs of buildings; all signs down; Very severe and extensive damage to windows and doors; Complete failure of roofs of many residences and inadequately designed industrial buildings; Extensive shattering of glass in windows and doors, some complete building failures; Small buildings overturned or blown away, complete destruction of mobile homes; Major damage to lower floors of all structures less than 15 ft. (4.6 m) above sea level within 500 yards (457 m) of shore; catastrophic damage destroying most buildings and vegetation, cutting off major roads, and flooding homes; Low-lying

			escape routes inland cut by rising water several hours before windstorm center arrives; possible required evacuation of residential areas on low ground within 5 to 10 miles (8 to 16 km) of shore
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Three different typhoons spinning over the western Pacific Ocean on August 7, 2006

Typhoon Categories will vary from country to country

Strength	Wind	Storm Surge	Damage
Category 1	less than 78 mph (125 km/h)	4–5 feet (1.2 m to 1.5 m)	Damage primarily to shrubbery, tree foliage and unanchored mobile homes; no real damage to other structures; minimal damage to plants and signs; Some damage to poorly constructed signs; Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings
Category 2	78 to 106 mph (125 to 170 km/h)	6–8 feet (1.8 m to 2.4 m)	Considerable damage to shrubbery and tree foliage; Major damage to exposed mobile homes; some trees blown down; Extensive damage to poorly constructed signs; Some damage to roofing materials of buildings; Coastal roads and low-lying escape routes inland cut by rising water two to four hours before arrival of windstorm center; some flooding, minimal damage to mobile homes, roofs,

Wind Storms - Continued

			and small crafts; Considerable damage to piers, marinas flooded; small craft in unprotected anchorages torn from moorings; evacuation required for some shoreline residences and low-lying islands
Category 3	107 to 140 mph (171 to 225 km/h)	9–12 feet (2.7 m to 3.6 m)	Limbs torn from trees and large trees blown down; Nearly all poorly constructed signs blown down; Damage to roofing materials of buildings; some window and door damage; Mobile homes destroyed; Serious flooding at coast and many smaller structures near coast destroyed; larger structures near coast damaged by battering waves and floating debris; Low-lying escape routes inland cut by rising water three to five hours before windstorm center arrives; extensive damage to small buildings and low-lying roofs; Flat terrain up to 5 ft. (1.5 m) above sea level flooded inland 8 miles (13 km) or more; possible required evacuation of low-lying residences within several blocks of shoreline.
Category 4	141 to 174 mph (226 to 280 km/h)	13–18 feet (4 m to 5.5 m)	Flat terrain up to 10 ft. (3 m) above sea level flooded inland as far as 6 miles (9.6 km); Shrubs and trees blown down; all signs down; Extensive damage to inadequately installed roofing materials, windows and doors; complete failure of roofs on many small residences; Complete destruction of mobile homes; Major damage to lower floors of structures near shore; Low-lying escape routes inland cut by rising water several hours before windstorm center arrives; extreme damage with destroyed roofs and mobile homes, downed trees, cut off roads, and flooded homes; Major erosion of beaches; possible required evacuation of all residences within 500 yards (457 m) of shore and single-story residences on low ground within 2 miles (3.2 km) of shore
Category 5	greater than 174 mph (280 km/h)	over 18 feet (5.5 m)	Shrubs and trees blown down; Considerable damage to roofs of buildings; all signs down; Very severe and extensive damage to windows and doors; Complete failure of roofs of many residences and inadequately designed industrial buildings; Extensive shattering of glass in windows and doors, some complete building failures; Small buildings overturned or blown away, complete destruction of mobile homes; Major damage to lower floors of all structures less than 15 ft. (4.6 m) above

Wind Storms - Continued

			sea level within 500 yards (457 m) of shore; catastrophic damage destroying most buildings and vegetation, cutting off major roads, and flooding homes; Low-lying escape routes inland cut by rising water several hours before windstorm center arrives; possible required evacuation of residential areas on low ground within 5 to 10 miles (8 to 16 km) of shore
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Ike



Rita



Irene

Japan

Scale Size of diameter (area) where wind velocity is more than 49.2 ft/s (15 m/s)	Minimum Central Sea Level Pressure
Very Small Radius	less than 124 mi (200 km)
Small Radius	less than 124 and 186 mi (200 and 300 km)
Medium Radius	less than 187 and 311 mi (301 and 500 km)
Large Radius	less than 312 and 497 mi (501 and 800 km)
Extra Large Radius	more than 497 mi (800 km)
Strength	Maximum Wind Velocity
Weak	38 to 56 mph (17 to 25 m/s)
Ordinary	57 to 74 mph (25 to 33 m/s)
Strong	75 to 98 mph (34 to 44 m/s)
Very Strong	99 to 121 mph (45 to 54 m/s)
Extremely Strong	Above 121 mph (54 m/s)



Irene



Irene



Irene on Hatteras Island, N.C

Hong Kong

Category	Minimum Central Sea Level Pressure
1	990 mb or less
2	950 mb or less
3	920 mb or less



Irene



Hurricane Georges.



Andrew

Taiwan

Typhoon Strength	Maximum Wind Speed at Center
Tropical Storm	Below 38 mph (17.2 m/s)
Light	39 to 73 mph (17.2 to 32.6 m/s)
Medium	73 to 114 mph (32.7 to 50.9 m/s)
Strong	Above 114 mph (51 m/s)
Super	Above 150 mph (67 m/s)



Before a Hurricane

- Talk with members of your household and create an evacuation plan. Planning and practicing your evacuation plan minimizes confusion and fear during the event.
- Learn about your community's hurricane response plan. Plan routes to local shelters, register family members with special medical needs as required and make plans for your pets to be cared for.
- Create a family communication plan in case you are separated. Keep in mind phone lines and cell phone towers may be down.
- Create a family evacuation plan and an emergency supplies kit.
- Check your disaster supplies and replace or restock as needed. Be sure you have enough water, food and medications for your family, including pets for at least 3 days.
- Install straps or clips to secure your roof to the frame structure.
- Listen to a NOAA Weather Radio for critical information from the National Weather Service (NWS).
- Bring in anything that can be picked up by the wind (bicycles, lawn furniture).
- Make sure trees and bushes are well trimmed and maintained.
- Close windows, doors and hurricane shutters. If you do not have hurricane shutters, close and board up all windows and doors with plywood. Install permanent storm shutters or have supplies available to board up your windows.
- Turn the refrigerator and freezer to the coldest setting and keep them closed as much as possible so that food will last longer if the power goes out.
- Turn off propane tanks and unplug small appliances.
- Fill your car's gas tank.

- Make sure your Important Documents book is in a water proof container and within reach.
- Turn off utilities if told to do so.
- Evacuate if advised by authorities. Be careful to avoid flooded roads and washed out bridges.
- Because standard homeowners insurance doesn't cover flooding, it's important to have protection from the floods associated with hurricanes, tropical storms, heavy rains and other conditions that impact the U.S. For more information on flood insurance, please visit the National Flood Insurance Program Web site at www.FloodSmart.gov.



During a Hurricane

- If you are told to evacuate:
 - NEVER ignore an evacuation order.
 - Follow the guidelines given regarding times and routes.
 - Take only essential items and your emergency kit
 - Turn off gas, electricity and water if you have not already done so.
 - Disconnect all appliances.
 - Make sure your car's gas tank is full.
 - Do not walk in moving water.
 - Do not drive in high water (As little as 6 inches can cause a stall or loss of control)
 - Follow the designated evacuation plan and expect a high volume of traffic.
- If you are NOT told to evacuate:
 - Stay tuned to emergency stations on TV or radio. Listen for further instructions.
 - Stay away from windows and doors by seeking shelter in a bathroom or basement.
 - Prepare to evacuate to a shelter or neighbor's home if your home is damaged.
 - Do not go outside until instructed to do so even if the storm is over and it seems calm. When the eye of the hurricane passes, it is calm for awhile but does not remain that way.



Andrew Florida



Katrina

After a Hurricane

- Continue listening to a NOAA Weather Radio or the local news for the latest updates and to make sure water supplies are not contaminated.
- Stay alert for extended rainfall and subsequent flooding even after the hurricane or tropical storm has ended.
- If you evacuated, return home only when officials say it is safe.
- Drive only if necessary and avoid flooded roads and washed-out bridges. Avoid any roads where flood waters have receded as they may have weakened and could collapse under the weight of a car.
- Keep away from loose or dangling power lines and report them immediately to the power company.
- Avoid flood waters, standing or moving, as they may be contaminated or deeper than expected.
- Be extremely cautious when entering buildings and homes as there may be unseen damage.
- Stay out of any building that has water around it.
- Inspect your home for damage. Take pictures of damage, both of the building and its contents, for insurance purposes.
- Wear protective clothing and be cautious when cleaning up to avoid injury.
- Clean and disinfect everything that was touched by flood water, as it can contain sewage and other contaminants.
- Use flashlights in the dark. Do NOT use candles.
- Avoid drinking or preparing food with tap water until you are sure it's not contaminated.
- Check refrigerated food for spoilage. If in doubt, throw it out.
- Watch animals closely and keep them under your direct control.
- Use the telephone only for emergency calls.



NC Photo courtesy of NOAA

Additional Information to Get You Started

Hurricane Safety Checklist <http://www.redcross.org/www-files/Documents/pdf/Preparedness/checklists/Hurricane.pdf>

Centers for Disease Control and Prevention (CDC) www.bt.cdc.gov/disasters/hurricanes/

Department of Homeland Security (Ready.gov) www.ready.gov/america/beinformed/hurricanes.html

Talking About Disaster-Guide for Standard Messages-Hurricanes and Tropical Storms Mar 2007

http://www.redcross.org/images/pdfs/code/Hurricanes_and_Tropical_Storms.pdf

How to make a Plywood Hurricane Shutter <http://www.aoml.noaa.gov/hrd/shutters/index2.html>

Avoiding Hurricane Damage

http://www.fema.gov/pdf/media/factsheets/2011/avoiding_hurricane_damage.pdf

Severe Windstorm Checklist http://www.fmglobal.com/pdfs/windstorm_planning.pdf

Emergency Checklist Wind <http://www.wgains.com/assets/attachments/FMGlobalChecklist.pdf>



Emergency Supply Kit

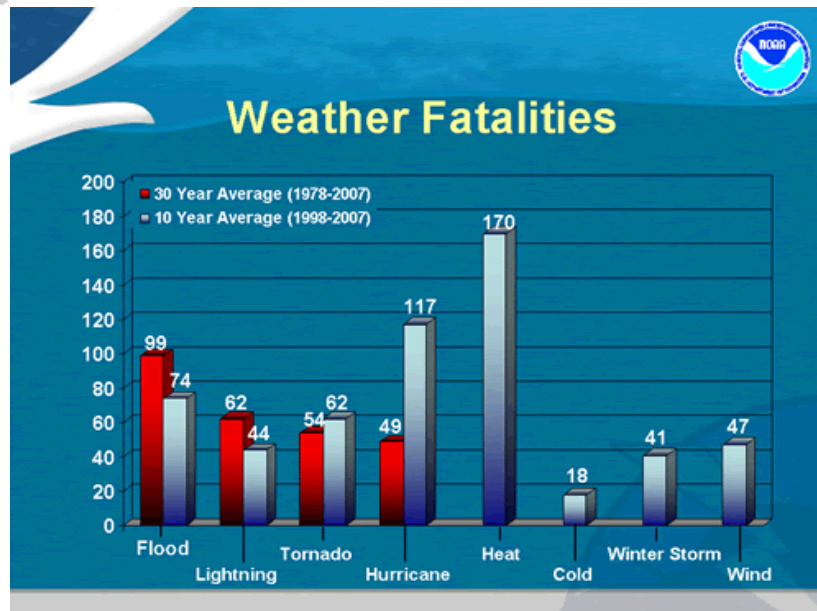
These have many names and are generally for 3-10 days. To be truly prepared have an individual kit for each household member and pet; one for each vehicle and a household one.

The basics for these kits are:

Water	Store 1 gallon per person per day (3 day minimum)
Food	Non-perishable, easy-to-prepare food for each person — foods that require no refrigeration, cooking or preparation. Rotate the supply every 6 months.
Medications	Keep a 7-day supply of vital medications on hand at all times
First aid kit	Including bandages, scissors, latex gloves, sterile pads, sterile roll bandages, tweezers, petroleum jelly, cleansing agents, antiseptic ointment or spray, ACE bandages and first aid booklet.
Water Purification	Unscented household bleach to purify water
Toiletries, Personal Hygiene	Toilet paper, feminine supplies, plastic garbage bags and ties, infant supplies, soap and personal hygiene items.
Baby supplies	bottles, formula, baby food, diapers
Batteries, Extra	Spares for each battery operated item in your emergency kit
Bedding & Clothing	Sleeping bag, blanket and at least one complete change of clothing and footwear for all household members; hat and sturdy shoes; Rain gear; socks & undies; long sleeved shirts and pants (can roll up sleeves and pant legs)
Blanket(s)	Emergency or Space blanket one for each person and pet
Camera	for photos of damage
Communications	Arrange backup communications, such as two-way radios, GMRS, FMRS, HAM, etc. and have extra batteries and or power packs for them. (If cell or 'repeater' towers collapse or run out of power your range will be much shorter so have a pre-arranged 'listening network' and practice at least twice a year.
Communications, Family Contact	emergency contact information

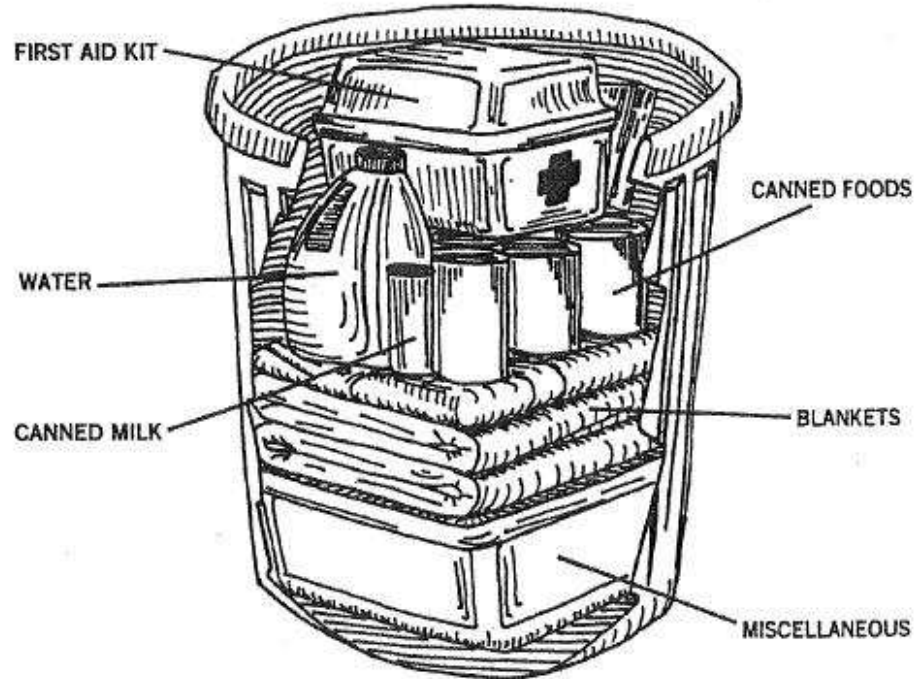
Fire Prevention	Maintain Smoke and carbon monoxide alarms; Maintain and know how to use a fire extinguisher.
Flashlight	Hand crank and or extra batteries
Important Documents	Keep important family documents in a fireproof & waterproof container with the household emergency kit/go-bag. Kit(s)/Go-bag(s) should contain at least: medication list and pertinent medical information, proof of address, wills, insurance policies, deeds, stock certificates, bonds, bank account numbers, passports, social security cards, immunization records, credit card numbers, and birth, marriage and death certificates. Store this in a fireproof and water tight container with your household emergency bag/kit.
Insect repellent	
Keys, extra set	Vehicle and house
Map(s)	Of you area; evacuation routes; bug-out routes, etc.
Medical Items	Hearing aids with extra batteries, glasses, contact lenses, syringes, cane, etc.
Money	At least \$20.00 in quarters
Pet supplies	collar, leash, ID, food, carrier, bowl
Pets	Extra food, drinking water, supplies and medicines for your pets.
Radio, portable	Battery-operated or hand crank radio and a EAS-type NOAA Weather Radio with a tone alert.
Security	Have an after the crisis security and safety plan and practice at least twice a year.
Sunscreen	
Tools and supplies	Including a Multi-purpose tool; paper plates, plastic utensils, small amount of cash, fire extinguisher, pliers, compass, aluminum foil, flares, wrench to shut off utilities, flashlight, extra batteries, non-electric can opener, matches, pencil and paper, whistle, shelter tarps, dust mask and work gloves and for securing your home

Your choice should be driven by your specific circumstances.



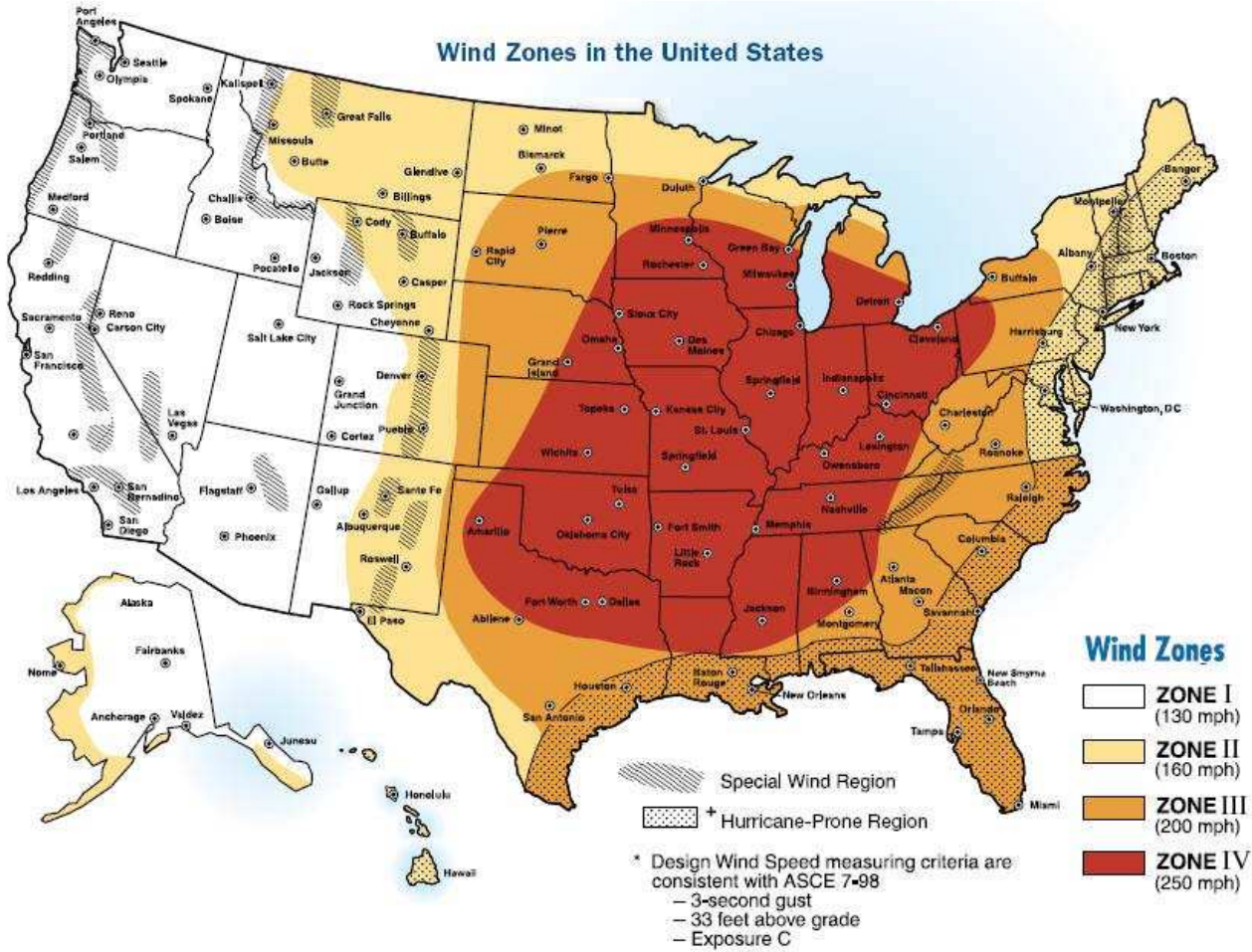
Storage of Emergency Supplies

Some families prefer to store their emergency supplies in one location. Choose a place in your home which would be relatively safe in time of an earthquake (such as a closet or under a bed). The perishable supplies will remain stable longer if stored in a cool, dark location.



One suggested method for storing emergency supplies is to place them in a large, covered trash container. They can be layered as shown and all kept together in the large covered container.

*** Note:** It is best to store plastic water containers on top of the contents rather than on the bottom where they could possibly crack and leak from the weight of heavy objects placed on top of them.



Oops

Formerly NMC



I don't think we are in Kansas anymore!



Take Responsibility
Make a Plan
Have a Kit
Practice
Stay Aware

TNT

Formerly NM Urban Homesteading